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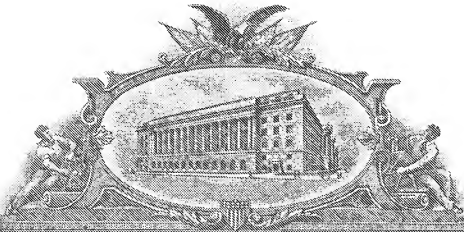
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(e).

INVENTOR(S)			
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<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheet(s) attached hereto			
TITLE OF THE INVENTION (500 characters max) WLAN SERVICES OVER CATV USING CSMA/CA			
CORRESPONDENCE ADDRESS Direct all correspondence to the address for SUGHRUE MION, PLLC filed under the Customer Number listed below: WASHINGTON OFFICE 23373 CUSTOMER NUMBER			
ENCLOSED APPLICATION PARTS (check all that apply)			
<input checked="" type="checkbox"/> Specification	Number of Pages	17	<input type="checkbox"/> CD(s), Number _____
<input checked="" type="checkbox"/> Drawing(s)	Number of Sheets	20	<input type="checkbox"/> Other (specify) _____
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76			
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT			
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. <input type="checkbox"/> A check or money order is enclosed to cover the Provisional filing fees. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. <input checked="" type="checkbox"/> The USPTO is hereby authorized to charge the Provisional filing fees to our Deposit Account No. 19-4880. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.			<div style="border: 1px solid black; padding: 5px;"> FILING FEE AMOUNT (\$) \$80.00 </div>
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government. <input checked="" type="checkbox"/> No. <input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____			

Respectfully submitted,

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

WLAN SERVICES OVER CATV USING CSMA/CA

TECHNICAL FIELD

[01] The invention relates to a system, method, and novel apparatuses to implement a new topology for Wireless Local Area Networks (WLAN) and the like, including WiFi systems. Cable television networks (CATV networks) are enabled to serve high speed wireless data for hotspots such as hotels, hospitals, airports and the like with high capacity and high quality.

[02] In particular, the invention relates to an extension to conventional WLANs using CATV networks to support WiFi services in hotspots. According to one aspect of the invention, CATV networks are merged with WLAN to provide improved data quality, better coverage, and better range, while enhancing network capacity to support WiFi services in hotspots, using a modified CSMA/CA configuration.

DISCUSSION OF THE RELATED ART

[03] A WLAN is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN.

[04] In a typical WLAN configuration, a transmitter/receiver device, called a wireless access point (WAP), connects the user wireless device to the wired network fixed location using standard Ethernet connection (cable, ADSL, T1, etc.). The WAP receives, buffers, and transmits data between the WLAN and the wired network infrastructure. A single WAP can support a small group of users and can function within ranges of up to several hundred feet. End users access the WLAN through WLAN modem device.

[05] The conventional implementation of a WLAN system is based on Carrier Sense Multiple Access Collision Avoidance (CSMA/CA) mode. In this mode, each end unit in the network is listening to the network to determine whether the path is free for transmission. Only

when the path is free for transmission is the end unit allowed to transmit data. If a collision is detected, the data must be transmitted again.

[06] In this configuration, all the units participating in the network must be able to receive all the uplink/downlink data transmitted on the network all the time in the specified coverage area. This is the reason that it is necessary in a conventional WLAN system to have a WAP at any floor in the building and/or every 100 to 500 feet range, (to provide full coverage and good receiving signal performance by each of the participants in order to avoid and solve collision problems). This limitation is related directly to the maximum range that can be achieved by the conventional WLAN systems.

[07] CATV networks have a network architecture designed basically to transmit signals in a top-down or bottom-up manner. In this configuration, two adjacent downstream customers cannot listen to each other. Thus, a conventional implementation of WiFi CSMA/CA is impossible over a CATV network.

[08] One way used by the inventors to mitigate the above-identified disadvantages of WLAN is to integrate the WLAN system with the CATV network using Point Coordination Function (PCF). PCF is a centralized, polling-based access mechanism which requires the presence of an AP that acts as Point Coordinator. A WAP controller located at the center of the CATV network manages the system. In this mode, the discussion between end unit and WAP is controlled and no end unit is allowed to transmit data without permission of the WAP.

SUMMARY OF THE INVENTION

[09] Another way to mitigate the above-identified disadvantages is to integrate the WLAN system with the CATV network using a modified CSMA/CA configuration.

[10] One object of the invention to overcome the above-identified limitations of the present WLAN systems, and the above-identified disadvantages of the above-identified related attempts to integrate WLAN systems with CATV networks for hotspot usage.

[11] According to an aspect of the invention, there is provided an extension to WLAN systems whereby a CATV network is enabled to communicate WLAN data traffic using a modified CSMA/CA configuration with switching capability for hotspots areas like hotels, airports, hospitals and the like.

[12] In one embodiment of the invention that helps achieve one or more of the above objects of the invention, the CATV network functions as an access element within the analog portion of the WLAN system, namely in its RF propagation-radiation section. The capabilities of existing CATV networks are substantially preserved in the approach, and the WLAN end users terminals do not have to be substantially modified. That is to say, in a preferred embodiment, the signals sent according to the WLAN terminal communications protocol traverse the CATV network, without the necessity for modification.

[13] According to another embodiment of the invention, a number of WAPs can be located at the CATV hotspot entrance, to be integrated into the CATV network, thus increasing the capacity of the WLAN-CATV network.

[14] One protocol used in the various embodiments of the invention is CSMA/CA, with modified system configuration to support CSMA/CA protocol through the CATV network.

[15] According to the invention, the CATV network is modified

[16] to permit the communication of the WLAN RF signals without substantial modification, just frequency up and down-conversion to fit the CATV spectrum specifications, and

[17] to enable the CATV network to support CSMA/CA protocol.

[18] A traditional CATV network is a two-way network having a tree topology and including cables, amplifiers, signal splitters/combiners and filters. According to one aspect of the invention, the cables and signal splitters/combiners are not modified, but the other elements are. Thus, the invention includes new components for a CATV system that permit multi-band communication. The modified components allow all types of signals (the CATV up and down signals and the WLAN up and down signals) to be carried by the network simultaneously in a totally uncoupled manner.

[19] According to another aspect of the invention, there is provided an Enhanced In Door WiFi Unit (EID-WiFi, see Fig 2, also referred to in the figures as PINDUTM for PASSOVER INDOOR UNIT). The EID-WiFi is a component, which acts as a transmit, receive antenna for the WLAN signals, and as a cable input output unit for the CATV network.

[20] According to another aspect of the invention, the EID-WiFi is working in switching mode where the Uplink and Downlink paths are switched on and off based on activity control.

[21] According to another aspect of the invention, the EID-WiFi is a dual mode unit. That is to say, the EID-WiFi is capable to receive and transmit in modes 802.11b, 802.11g and 802.11a at frequencies of 2.4 GHz and 5.3 GHz correspondingly.

[22] According to another aspect of the invention, there is provided an Up Down Converter Unit (UDC, see Fig 6). The UDC is a component, which acts as frequency converter, converting the WAP WiFi signals from:

[23] original RF 2.4 GHz for 802.11b, 802.11g and 5.3 GHz for 802.11a frequencies to 1080 - 1155 MHz Uplink and to 960 - 1035 MHz downlink, (or any other set of uplink, downlink frequencies within the range of 960 to 1200 MHz) and injected into the CATV network; and

[24] the 1080 - 1155 MHz Uplink and the 960 - 1035 MHz downlink to the original RF 2.4 GHz for 802.11b, 802.11g and 5.3 GHz for 802.11a frequencies.

[25] The UDC is equipped with RF sensor to detect the uplink signals and retransmit them at the downlink path to be received by the other WiFi terminal units during the Carrier Sense period. Most of the existing CATV video signals are already limited to frequencies under 750MHz (digital CATV goes up to 860 MHz) while WLAN systems operate above this limit. Moving the WLAN signals to the frequency range of 960 to 1155 MHz enables for the WLAN signals and the CATV signals to coexist.

[26] According to another aspect of the invention, there is provided a UDC which converts the WAP WiFi signals from original RF 2.4 GHz for 802.11b, 802.11g and 5.3 GHz for 802.11a frequencies to 20 MHz bandwidth in the range of 5 - 45/65 MHz Uplink and to 20 MHz bandwidth in the range of 500 - 750/860 MHz downlink, and injected into the CATV network. And vice versa converting the 5 - 45/65 MHz Uplink and to 500 - 750/860 MHz downlink to the original RF 2.4 GHz for 802.11b, 802.11g and 5.3 GHz for 802.11a frequencies. The UDC is equipped with RF sensor to detect the uplink signals and retransmit them at the downlink path to be received by the other WiFi terminal units during the Carrier Sense period.

BRIEF DESCRIPTION OF THE DRAWINGS

[27] Fig. 1 shows a multi story building with a WLAN over CATV system working within the CATV spectrum 5 - 45/65 MHz Uplink and 500 - 750/860 MHz Downlink.

[28] Fig. 2 shows a multi-story building with a WLAN over CATV system working out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink

[29] Fig. 3 shows a multi-story building with a WLAN over CATV system working out of the CATV spectrum 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink with multiple WAP units

[30] Fig. 4 shows Downlink switching configuration to support CSMA/CA over CATV

[31] Fig. 5 shows Uplink switching configuration to support CSMA/CA over CATV

[32] Fig. 6 shows simplified schematic view of an EID-WiFi.

[33] Fig. 7 shows a simplified schematic view of a WLAN Transport Module (WTM). The WTM is a bypass unit that differentiate between the CATV signals and the WLAN down/up-converted signals (1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink) at the input/output of each CATV amplifier in the network and combine the signals again at the output/input of each CATV amplifier to be carried on to the next amplifier stage.

[34] Fig. 8 shows, in simplified schematic form, a WLAN Entrance Module (WEM). The WEM is a dual band UDC that converts the WLAN signals from their original signals i.e. 2.4 GHz (due to 802.11b) and/or 5.3 GHz (due to 802.11a) to 1,2 or 3X20 MHz up and 1,2 or 3X20 MHz down at any 20 MHz frequency bandwidth in the frequency band of 960 - 1035 MHz 1080 - 1155 MHz and/or 5 - 45/65 MHz 500 - 750/860 MHz. The WEM module UDC, converts TDD downlink signals to FDD downlink signals to be transmitted over the CATV network, and uplink FDD signals coming from the CATV network to uplink TDD signals to be transmitted to the WAP.

[35] Fig 9 shows a dual mode WEM UDC module, that integrates both 802.11b and 802.11a signals from the WAPs into the CATV network. The units enable to provide both methods of WiFi signals 802.11b and 802.11a on the same CATV network.

[36] Fig. 10 shows, in simplified EID-WiFi switched module UDC, that converts the FDD Downlink WLAN signals received from the CATV network to TDD Downlink signals to be transmitted at the customer premises and converts back TDD uplink signals received from the customer premises to FDD uplink signals to be transmitted on the CATV network towards the WAP.

[37] Fig. 11 shows, in simplified form, a dual mode switched EID-WiFi module. This module enable the user to work with one EID-WiFi unit and support both 802.11b and 802.11a signals.

[38] Fig. 12 and 13 show the original 802.11b, 802.11g and 802.11a frequencies

[39] Fig. 14 shows one bandwidth allocation plan for 802.11b, and 802.11g non-overlapping channels shifted frequency within the CATV network spectrum

[40] Fig. 15 shows one bandwidth allocation plan for 802.11b, and 802.11g overlapping channels shifted frequency within the CATV network spectrum

[41] Fig. 16 shows one bandwidth allocation plan for 802.11a channels shifted frequency within the CATV network spectrum

[42] Fig. 17 shows one bandwidth allocation plan for 802.11b, and 802.11g non-overlapping channels shifted frequency working out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink

[43] Fig. 18 shows one bandwidth allocation plan for 802.11b, and 802.11g of overlapping channels shifted frequency working out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink

[44] Fig. 19 shows one bandwidth allocation plan for 802.11a channels shifted frequency working out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink

[45] Fig. 20 shows bandwidth allocation plan for 802.11b, and 802.11g and/or 802.11a channels working simultaneously out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[46] The invention will now be described by way of example using one or more presently preferred embodiments. It will be understood, however, that this and the other exemplary embodiments mentioned herein are provided only for the sake of a clear explanation, and are not themselves intended to show the complete scope of the invention. The complete scope of the invention should be interpreted in the light of any appended claims.

[47] Fig. 1 shows a multi story building with a WLAN over CATV system working within the CATV spectrum 5 - 45/65 MHz Uplink and 500 - 750/860 MHz Downlink. The figure includes the WLAN Entrance Module (WEM), which converts the original WLAN RF signal to the assigned frequency spectrum to be carried on the CATV network. The EID-WiFi which acts as a UDC repeater to return the WLAN signals to their original signals, and differentiate between the CATV signals to be carried to the TV or Set Top Box and the WLAN signals to be transmitted in the customer premises. Signals from the WAP entering at the WEM are converted

and distributed through the CATV network. The EID-WiFi is the interface between the upgraded WLAN CATV network and the WLAN (end user) unit at the customer premises.

[48] Fig. 2 shows a multi-story building with a WLAN over CATV system working out of the CATV spectrum at frequencies: 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink. The figure includes the WLAN Entrance Module (WEM), which converts the original WLAN RF signal to the assigned frequency spectrum to be carried on the CATV network. The WTM, which acts as a bypass module to enable transmission of the WLAN signals over the CATV networks without interference between both signals. The EID-WiFi which acts as a UDC repeater to return the WLAN signals to their original signals, and differentiate between the CATV signals to be carried to the TV or Set Top Box and the WLAN signals to be transmitted in the customer premises. Signals from the WAP entering at the WEM are converted and distributed through the CATV network. The WTM transports the WLAN signals through the CATV network. The WTM is installed at any active point of the CATV network, bypassing the trunk amplifiers, line extenders and distribution modules. The EID-WiFi is the interface between the upgraded WLAN CATV network and the WLAN (end user) unit at the customer premises.

[49] Fig. 3 shows a multi-story building with a WLAN over CATV system working out of the CATV spectrum 1080 - 1155 MHz Uplink and 960 - 1035 MHz Downlink with multiple WAP units. The figure includes Multiple WLAN Entrance Module (WEM), connected to multiple WAP's. Each WEM is connected to a WAP which converts the original WLAN RF signal to the assigned frequency spectrum to be carried on the CATV network. The WEM's can convert any WAP original frequencies standard (802.11b, g or a) to the assigned frequency spectrum. The WAP's WEM's can be from the same standard with the same original frequencies or different original frequencies to support high capacity throughput or from different standards

to support all WLAN standards on the CATV network. The WTM, which acts as a bypass module to enable transmission of simultaneously multiple WLAN signals over the CATV networks without interference between both signals. The EID-WiFi which acts as a UDC converter repeater to return the WLAN signals to their original signals, and differentiate between the CATV signals to be carried to the TV or Set Top Box and the WLAN signals to be transmitted in the customer premises. Signals from the WAP entering at the WEM are converted and distributed through the CATV network. The WTM transports the WLAN signals through the CATV network. The WTM is installed at any active point of the CATV network, bypassing the trunk amplifiers, line extenders and distribution modules. The EID-WiFi is the interface between the upgraded WLAN CATV network and the WLAN (end user) unit at the customer premises.

[50] Figs. 4 and 5 show Downlink and Uplink switching configuration to support CSMA/CA over CATV. The WEM unit connected to the WAP includes a single-pole, double-throw (SPDT) RF switch in the downlink path and a single-pole, single-throw (SPST) RF switch in the uplink path. The EID-WiFi at the customer premises includes SPST switches in the up and downlink path.

[51] **Downlink Signals:** Downlink signals sent from the WAP towards the customer premises are detected by the WEM, and the downlink SPDT closes the downlink path to enable transmission of the signal through the CATV network towards the subscriber premises. At the same time, the uplink switch is open to prevent oscillations. At the customer premises, the EID-WiFi's 1, 2, 3, 4, and 5 detect the downlink signal, close the downlink SPST, and open the uplink SPST to prevent oscillations.

[52] **Uplink Signals:** End User Terminal No. 1 transmits uplink signals towards the WAP. EID-WiFi No. 1 detects the uplink signal, closes the uplink switch, and opens the

downlink. Uplink signals are distributed over the CATV network to the WAP. At the same time, all the other EID-WiFi's switches are closed at the downlink path and open at the uplink path. At the WEM, the uplink signal is detected and the uplink switch is closed, while changing the position of the downlink SPDT to loop the uplink signals back towards the CATV network to distribute the looped back uplink signals to the other EID-WiFi's 2, 3, 4, and 5, which are connected to the downlink path. This enables the carrier sense function in the other EID-WiFi's. The WEM, with its circuitry for looping the uplink signals back to the CATV network, may be thought of as a means for downstream carrier sensing of uplink signals.

[53] A more detailed view of an exemplary EID-WiFi is shown in Fig. 6. The combined WLAN and CATV signals enter at the CATV outlet. The WLAN and CATV signals are differentiated at a Network Coupling Duplexer (NCD). The WLAN signals are up-converted to the original WLAN signal from the CATV assigned spectrum, or down-converted from the original WLAN signals to the CATV assigned frequency spectrum and transmitted in the vicinity of the customer premises. The TV signals are connected to the TV set (or any other suitable device) through the TV set outlet.

[54] Fig. 7 depicts the WTM. The combined WLAN and CATV signals enter the WTM. Through the high-pass / low-pass filter (HP/LP) the signals are distributed into two different channels; one channel carries the CATV signals and the other carries the WLAN signals. At the end of the path the signals are combined again through the HP/LP to be carried through the network. That is, the combined WLAN and CATV signals enter at the entrance of the LP/HP duplexer. The duplexers each differentiate between the CATV signals and the WLAN signals. The CATV signals 5 - 750MHz (860MHz) are carried through the LP filter to the CATV amplifier. The output signals from the CATV amplifier are carried to an additional LP filter to be

combined again with the WLAN signals. The WLAN signals are carried to/from the HP output to the WLAN filter, and the WLAN filter differentiates between the up-link and down-link signals to be amplified by the amplifiers to balance the power budget along the pass. The cellular signals from the amplifiers are connected to the HP/LP filters via the fibers, to be combined with the CATV signals and carried on through the network.

[55] Fig. 8 shows the WEM. The WEM is an interface between the WLAN and the CATV signals. Downlink WLAN signals from the WAP are down-converted to the assigned CATV spectrum and Uplink WLAN signals are up-converted from the assigned CATV frequency spectrum to the original WLAN frequencies. The signals then are carried through the WEM and combined through the HP/LP to the CATV signals to be carried through the network. The WEM down-converts the original 802.11b, or the 802.11a signals received from the WAP to intermediate WiFi frequencies to be carried on the CATV network and up-converts the intermediate WiFi frequencies carried on the CATV network to the original 802.11b or 802.11a to be received by the WAP.

[56] Fig. 9 shows a dual band WEM UDC. The dual band WEM enables the simultaneous carrying of both 802.11b and 802.11a signals on the CATV network to the customer premises. Each band is converted to a different portion of the spectrum in the CATV network. For Example: 802.11b may be converted to a 20 MHz bandwidth uplink and a 20 MHz downlink within the frequency range of the CATV, (960 - 980 MHz, and 1080 - 1100 MHz). 802.11a may be converted to another 20 MHz bandwidth uplink and a 20 MHz downlink within the frequency range of the CATV, (1000 - 1020 MHz, and 1120 - 1140 MHz).

[57] Fig. 10 shows a EID WiFi UDC; the EID WiFi down-converts the original 802.11b, or the 802.11a signals received from the end user terminal to the assigned CATV

network frequencies (960 - 1035 MHz in our example), and up-converts the WiFi signals carried on the CATV network (1080 - 1155 MHz) to the original 802.11b or 802.11a signals to be transmitted to the end user terminal. The EID WiFi is working in switch mode, and the uplink and downlink switches are remotely controlled from the central equipment.

[58] Fig. 11 shows a dual band EID-WiFi UDC. The dual band EID WiFi unit enables the reception and transmission of both 802.11b and 802.11a, simultaneously, on the CATV network and to the customer end user. This unit enables the use of both standards simultaneously on the network. For Example: 802.11b may be converted to 20 MHz bandwidth uplink, and 20 MHz downlink within the frequency range of the CATV, (960 - 980 MHz, and 1080 - 1100 MHz). 802.11a may be converted to another 20 MHz bandwidth uplink, and 20 MHz downlink within the frequency range of the CATV, (985 - 1005 MHz, and 1105 - 1125 MHz).

[59] Figs. 12 and 13 show the original 802.11b, g and 802.11a frequencies.

[60] Fig. 14 shows a frequency chart of the original 802.11b, 802.11g non overlapping frequencies. These original non overlapping frequencies are shifted to downlink and uplink frequencies such that the WLAN WiFi signals can be carried on the CATV network spectrum.

[61] Fig. 15 shows a frequency chart of the original 802.11b, and 802.11g overlapping frequencies. These original overlapping frequencies are shifted as needed to downlink uplink frequencies such that the WLAN WiFi signals can be carried on the CATV network spectrum.

[62] Fig. 16 shows a frequency chart of the original 802.11a frequencies. These original frequencies are shifted as needed to downlink and uplink frequencies such that the WLAN WiFi signals can be carried on the CATV network spectrum.

[63] Fig. 17 shows one bandwidth allocation plan for 802.11b, and 802.11g non-overlapping channels (shifted frequency working out of the CATV spectrum) at frequencies 1080 - 1155 MHz for Uplink and 960 - 1035 MHz for Downlink.

[64] Fig. 18 shows one bandwidth allocation plan for 802.11b, and 802.11g of overlapping channels (shifted frequency working out of the CATV spectrum) at frequencies 1080 - 1155 MHz for Uplink and 960 - 1035 MHz for Downlink.

[65] Fig. 19 shows one bandwidth allocation plan for 802.11a channels (shifted frequency working out of the CATV spectrum) at frequencies 1080 - 1155 MHz for Uplink and 960 - 1035 MHz for Downlink.

[66] Fig. 20 shows one bandwidth allocation plan for 802.11b, and 802.11g and/or 802.11a channels working simultaneously (out of the CATV spectrum) at frequencies 1080 - 1155 MHz for Uplink and 960 - 1035 MHz for Downlink.

[67] Although the foregoing exemplary embodiments of the invention have been presented in some detail, it will be appreciated that some details have been omitted to avoid obscuring the invention, and that the details presented are not all intended to be limiting with respect to the invention. It will also be appreciated that variations on the described implementations will occur to those familiar with this field.

Claims

There is claimed:

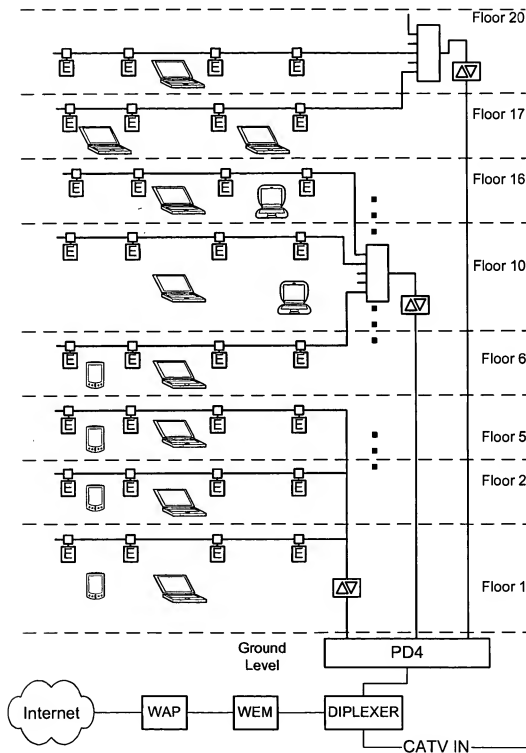
1. A communication system, comprising:
 - a CATV network;
 - a wireless access point (WAP) interfaced to the CATV network at a wireless entrance module (WEM);
 - and an Enhanced In Door WiFi Unit (EID-WiFi) connected to the CATV network;
 - wherein the WEM comprises means for downstream carrier sensing of uplink signals.
2. The communication system as set forth in claim 1, further comprising a wireless transport module (WTM) at at least one active point of the CATV network, between the EID-WiFi and the WEM.
3. The communication system as set forth in claim 1 wherein the WAP is adapted to communicate with end user devices according to one or more of the 802.11a, 802.11b, and 802.11g wireless standards.
4. The communication system as set forth in claim 3, wherein the EID-WiFi and the WEM are adapted to simultaneously communicate according to two or more of the 802.11a, 802.11b, and 802.11g standards.
5. The communication system as set forth in any one of claims 1 to 5, wherein the system communicates WLAN signals according to a CSMA/CA protocol.
6. A wireless entrance module (WEM), comprising:
 - an interface for communicating with a wireless access point (WAP);
 - an interface for communicating WLAN signals of the WAP over a CATV network; and
 - means for downstream carrier sensing of uplink signals.

7. The WEM as set forth in claim 6, further comprising a dual band up and down converter (UDC) adapted to simultaneously communicate according to two or more of the 802.11a, 802.11b, and 802.11g standards.
8. The WEM as set forth in any one of claims 6 to 7, communicating the WLAN signals according to a CSMA/CA protocol.

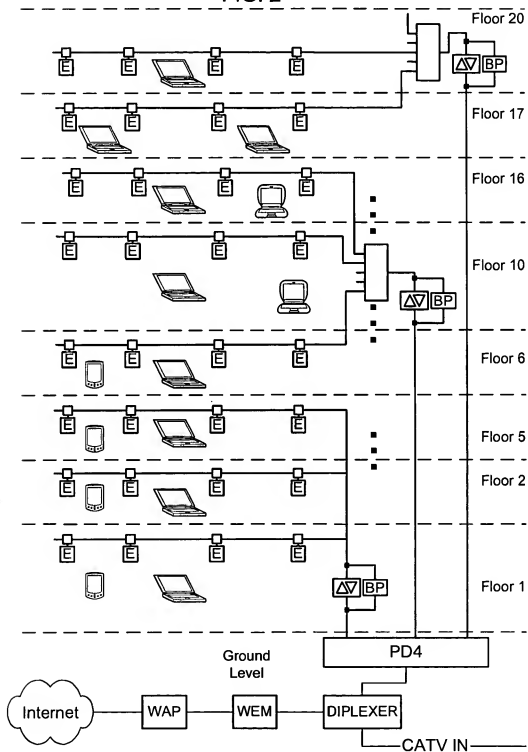
Abstract of the Disclosure

A CATV network provides access within an analog portion of a WLAN system, namely in its RF propagation-radiation section. Capabilities of existing CATV networks are substantially preserved. WLAN end user terminals do not have to be modified. Signals sent according to a WLAN terminal communications protocol traverse the CATV network, without modification, using CSMA/CA.

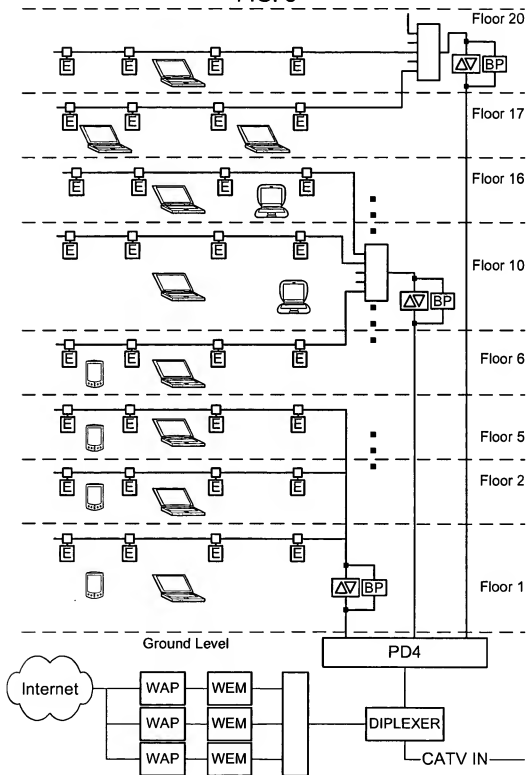
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FIG. 1



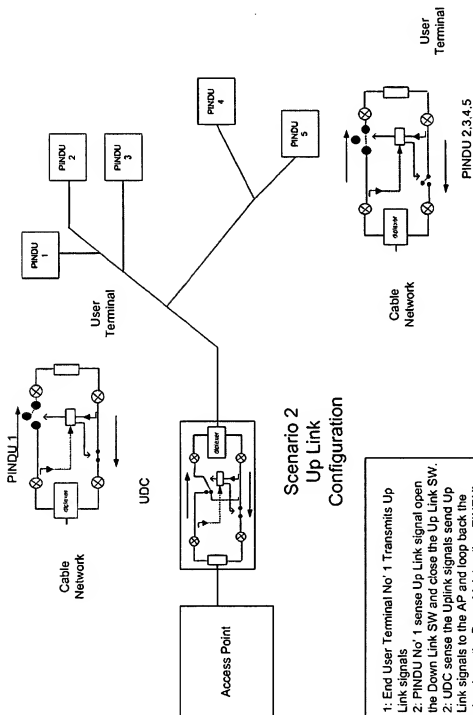
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FIG. 2



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FIG. 3

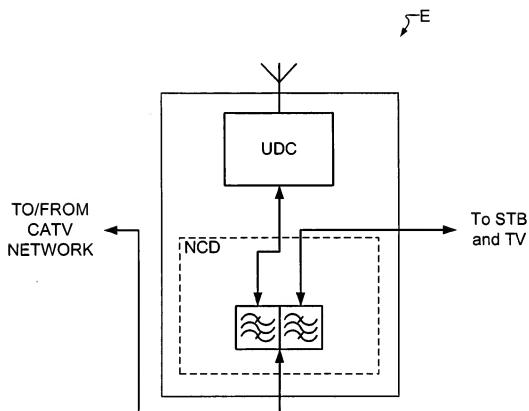


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 FIG. 5

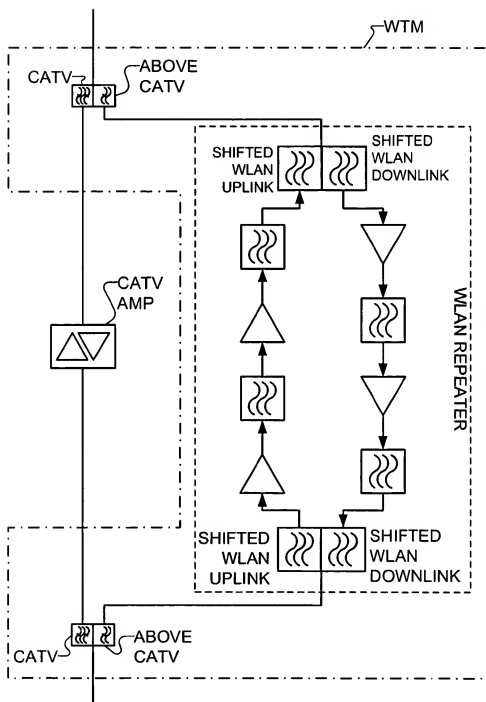


- 1: End User Terminal No' 1 Transmits Up Link signals
- 2: PINDU No' 1 sense Up Link signal open the Down Link SW and close the Up Link SW.
- 2: UDC sense the Uplink signals send Up Link signals to the AP and loop back the signals on the Down Link to other PINDU's 2,3,4,5
- 3: PINDU 2,3,4,5 sense the Down Link signal close the Down Link SW to send the signal to the end user terminal and open the up Link SW to prevent collision

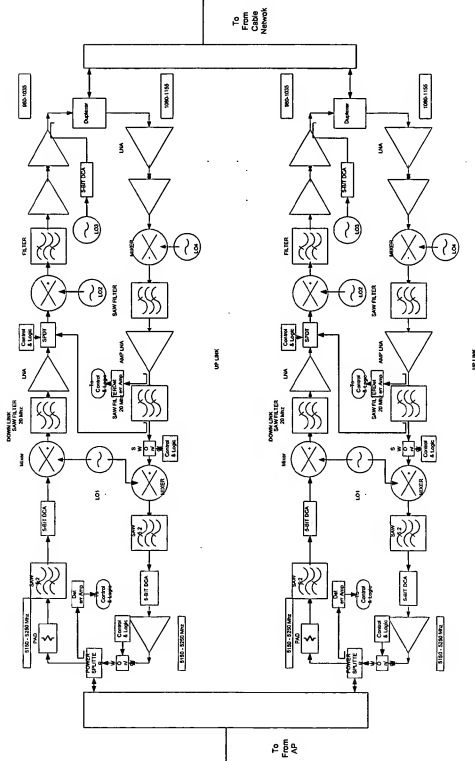
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FIG. 6



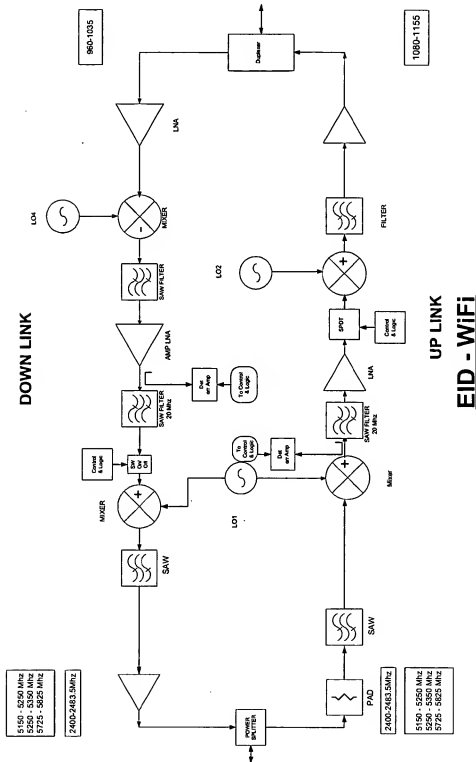
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FIG. 7

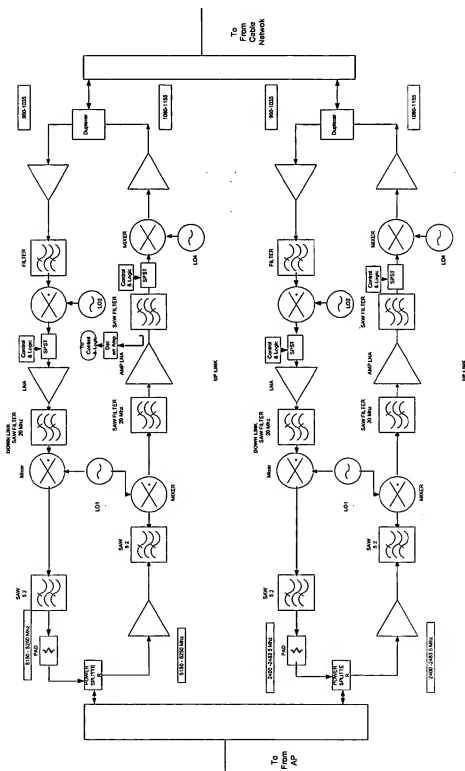






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 FIG. 10





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FIG. 12

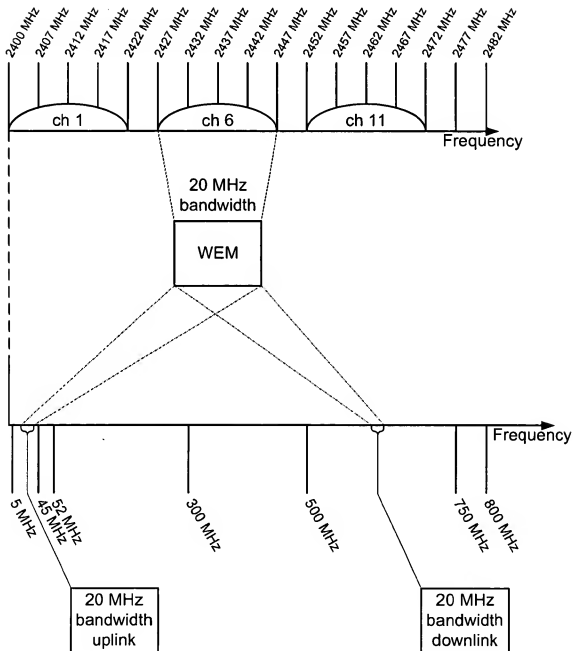
Regulatory domain

Channel	Frequency (MHz)	X'10' FCC	X'20' IC	X'30' ETSI	X'31' Spain	X'32' France	X'40' MKK
1	2412	x	x	x	-	-	-
2	2417	x	x	x	-	-	-
3	2422	x	x	x	-	-	-
4	2427	x	x	x	-	-	-
5	2432	x	x	x	-	-	-
6	2437	x	x	x	-	-	-
7	2442	x	x	x	-	-	-
8	2447	x	x	x	-	-	-
9	2452	x	x	x	-	-	-
10	2457	x	x	x	x	x	-
11	2462	x	x	x	x	x	-
12	2467	-	-	x	-	x	-
13	2472	-	-	x	-	x	-
14	2477	-	-	-	-	-	x

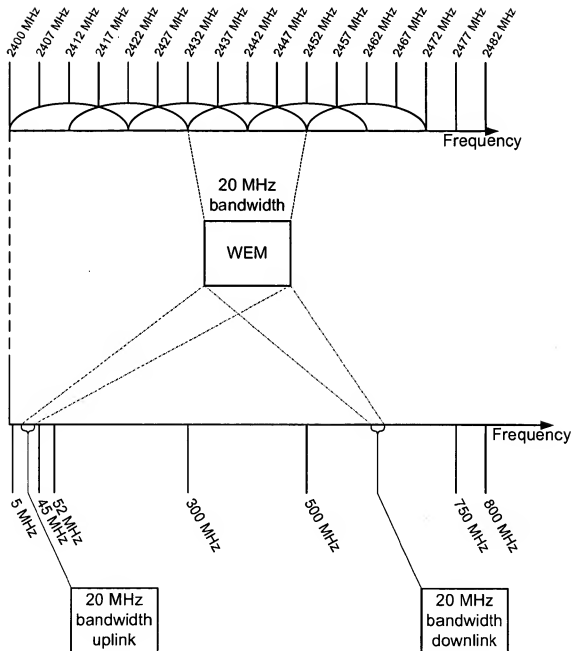
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FIG. 13

Channel Identifier	Frequency in MHz	Regulatory Domains			
		Americas (-A)	Japan (-J)	Singapore (-S)	Taiwan (-T)
34	5170	—	X	—	—
36	5180	X	—	X	—
38	5190	—	X	—	—
40	5200	X	—	X	—
42	5210	—	X	—	—
44	5220	X	—	X	—
46	5230	—	X	—	—
48	5240	X	—	X	—
52	5260	X	—	—	X
56	5280	X	—	—	X
60	5300	X	—	—	X
64	5320	X	—	—	X
149	5745	—	—	—	—
153	5765	—	—	—	—
157	5785	—	—	—	—
161	5805	—	—	—	—

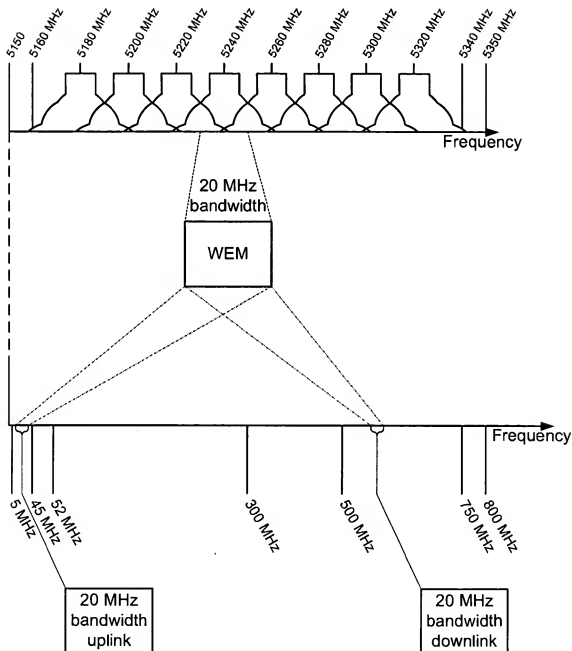
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FIG. 14



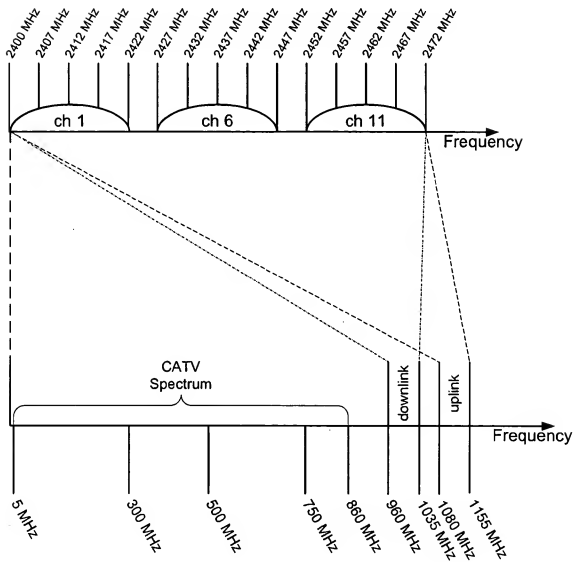
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FIG. 15



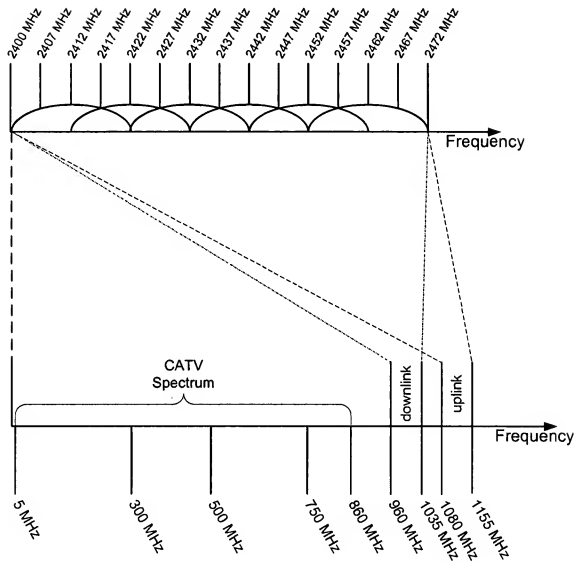
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FIG. 16



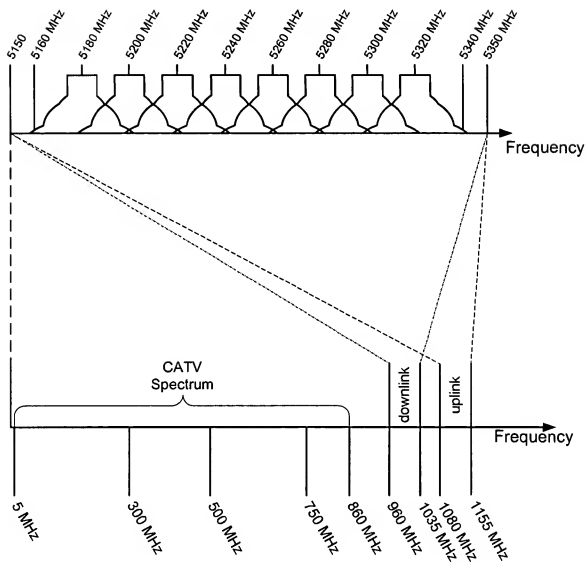
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FIG. 17



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FIG. 18



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FIG. 19



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FIG. 20

